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VIEWS, NEWS AND INTERVIEWS.

"I have often pitied motormen who were compelled to wear heavy buckskin gloves in the Summer time in order to protect their hands from the brake handle and controller handle," remarked an observing man. "I have also seen motormen who wore only one glove, and that on the right hand. This is because the brake handle is usually made of brass, and it seems that constant contact between the hand and the brass results in a kind of poisoning which makes the palm of the hand very sore. You will observe the same effect on the hands of conductors of open cars, who are obliged to swing themselves along the footboard by grasping the upright brass handles on the side-posts of the car. Controller handles are usually made of wood, so that, aside from the constant friction, the left hand is not so liable to become sore as the right hand. The other day I was down at Asbury Park and saw a motorman who had solved this problem in a simple and yet very satisfactory manner. He had taken a common canvas tobacco bag, one holding about two ounces, I should think, filled the bottom with a layer of waste, and inverted the bag over the knob of the brake handle. The draw string was then pulled taut and tied, making a splendid covering for a brass knob. This effectually protected his hand from contact with the brass, and also enabled him to avoid wearing a heavy glove. It struck me as being a cheap and admirable solution of an annoying problem."

While the Northwestern Electrical Association was visiting Sault Ste. Marie, Mich., a lone lieutenant of the militia was among those who welcomed the electricians. When the party left, three cheers for the "Army of Michigan" was given to the gallant and lone lieutenant.

The Brooklyn Heights Railroad Company, it is said, has recently employed 20 "lady spotters" to keep tabs on the conductors and their fare registers. The conductors claim that they have spotted the spotters and have devised a system of signals to warn each other of the presence of a spotter.

Dr. Cornelius Herz, whose death was chronicled in last week's ELECTRICAL REVIEW, was for some time one of the few honorary members of the National Electric Light Association. When his alleged connection with the Panama Canal frauds created such a scandal his name was dropped from the honorary list.

Mrs. Martha M. Place, of Brooklyn, N. Y., who was recently convicted of the murder of her step-daughter, has been sentenced to be electrocuted at Sing Sing during the week beginning August 29. If the sentence is carried out she will be the first woman to be executed by electricity.

A well known burglar, William Mason, alias "Big Bill," was arrested by central office detectives in New York city last week. He is wanted for numerous crimes and is suspected of the murder of George R. Blodgett, one of the General Electric Company's patent attorneys, at Schenectady, N. Y., on December 3, 1897.

There is a notice on the wall of the telephone exchange in Costa Rica requesting the lady operators to "abstain from smoking" while on duty. It is said the service in the exchange is fairly good, although no one seems to be in a particular hurry. The operators are leisurely in their movements, and vary their professional duties with cheerful conversation.

In the "La Bourgogne" disaster the Hall Signal Company, of Garwood, N. J., lost over $6,000 worth of batteries, relays, and other electrical machinery for signaling purposes, which they had shipped for France.

Mr. Thomas A. Edison is again a happy father, the latest arrival being a nine-pound son, born at Orange, N. J., on July 10. Mrs. Edison is getting along splendidly. The inventor is now the father of six children. Two daughters and a son were born to him by his first wife and two daughters and a son by his present wife.

A NIGHT VIEW OF THE UNITED STATES GOVERNMENT BUILDING AND THE ELECTRIC FOUNTAIN AT THE TRANS-MISSISSIPPI AND INTERNATIONAL EXPOSITION, OMAHA, NEB.

THE TRANS-MISSISSIPPI AND INTERNATIONAL EXPOSITION.

SOME OF THE ELECTRICAL FEATURES CONNECTED WITH THE OMAHA FAIR—MARVELOUS EFFECTS OF THE ILLUMINATION.

Modeled to a great extent after its more pretentious predecessor, the never-to-be-forgotten World's Fair at Chicago, the first great exposition, international in scope, ever held west of the Mississippi River, was opened on June 1 last at Omaha, Neb., and has already proved a most agreeable surprise to all who have visited it under the impression of perhaps seeing a magnified county fair.

A look at the beautiful bird's-eye view of the Court of Honor, named after that well remembered scene in Jackson Park, conveys a good idea of the general arrangement of the buildings. To the right, or north side of the lagoon, stand the three great structures devoted to machinery and electricity, manufactures and agriculture, while facing these, on the south side of the beautiful sheet of water, are the Mines, the Liberal Arts and Fine Art buildings. Looking from the east end of the lagoon, down the half-mile stretch of the bridge-spanned water, the scene by day is an impressive one, while at night it is grand and beautiful beyond description; much the most impressive and beautiful of the kind seen in any part of the world since the splendors of '93 have sunk into the silent past.

While the Court of Honor was undoubtedly the central feature of the many attractions at the World's Fair, it was laid out on a scale of such massiveness and grandeur that it produced an impression even more than inspiring, while here the several features are so successfully blended into an harmonious whole as to make the effect absolutely pleasing.

To fully appreciate the splendor of the scene one must let the eye roam at night over the pictures the artist has attempted to reproduce by the aid of the camera. Those who have stood in some quiet corner and gazed upon the shimmering water, in which

are mirrored the buildings with their softly gleaming outlines of mellow lights, the star-lit sky adding to the feeling of infinite peace, happiness and rest, will not discredit the story about the little girl, who, after some moments of silent contemplation, burst out with the query: "Mamma, is Heaven anything like this?"

Located immediately to the right of the eastern entrance to Machinery Hall, the pavilion of the American Electric Telephone Company, Chicago, attracts attention, not only through its favorable position, but also by the handsome and artistic manner in which the exhibit is arranged. That the public in general is becoming more and more interested in and appreciative of a higher quality of telephone apparatus, is evidenced by the goodly crowd which is nearly always found around the American booth, inspecting this or admiring that and talking about receivers and transmitters and magnetos as intelligently as a telephone engineer. Of course, a most complete line of the company's various types and styles of apparatus is shown. Some particular piece showing, perhaps, an extra touch of the brass finisher here, or an additional rub of the cabinet polisher in the finely finished woodwork, but as a rule, according to Mr. S. J. Bear, in charge of the exhibit, the apparatus is shown as regularly furnished to the company's patrons. A 100-line express board of the company's well known type occupies a prominent position, and its self-restoring drop, ring-off and rapid-ringing device are the subject of much scrutiny, and receive many an approving nod on the part of exchange managers. A mahogany booth, containing a special wall set, mounted in bird's-eye maple, is another attractive feature receiving much attention. Then there are wall sets in almost endless variety, bridging and series instruments, with the woodwork of oak, antique oak, cherry, mahogany, or any other finish as the fancy of the purchaser may dictate. The entire exhibit gives an impression of elegance, solidity and high quality in general, of which the American Electric Telephone Company and its able representative, Mr. S. J. Bear, who planned and executed the entire arrangement, may well be proud.

The exhibit of the Weston Electrical Instrument Company, the first on the left of the center aisle, reminds one strongly of the company's exhibit at Madison Square Garden in the general arrangement of the large panel, line of showcases and exhibition tables; but in this case the space is covered by a handsomely tiled roof, supported by rows of Corinthian and Ionic columns. Like the New York exhibit, a large panel extends the entire length of the space. Hereon are mounted, in a symmetrical manner, the various types of station or wall instruments, while a complete line of smaller apparatus, portable and semi-portable, is shown in cases and on tables. Everything is conspicuously shown and minutely explained by Messrs. R. S. Mueller and C. L. Stone, the efficient gentlemen in charge of the exhibit. The electrical engineer, although perhaps quite familiar with many of the instruments shown, can not help but marvel, in looking over a collection of this kind, at the wonderful progress constantly made in the scope and perfection of these excellent and necessary instruments.

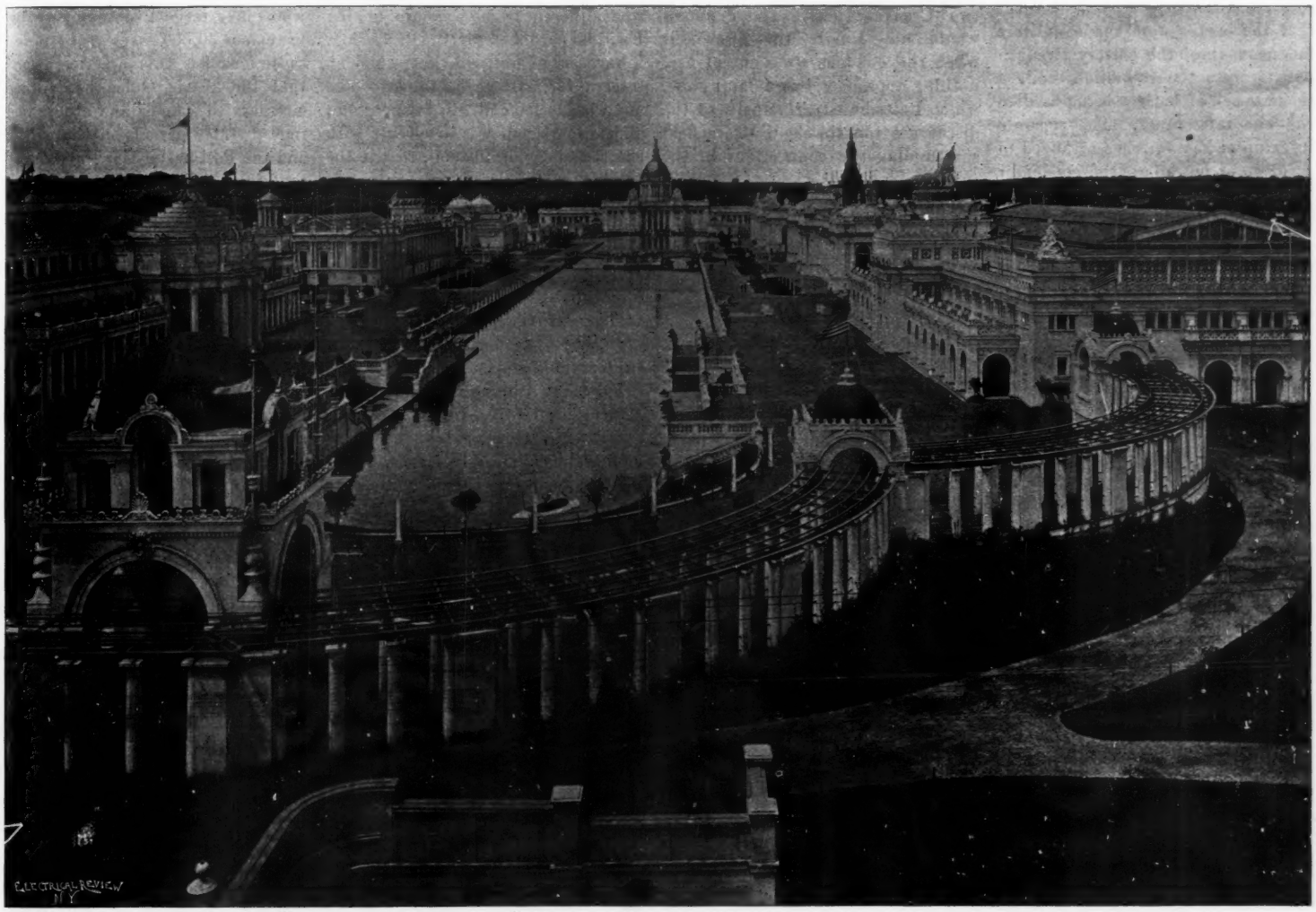
The Western Telephone Construction Company, Chicago, occupies space 795 at the east end of the south aisle. Mr. Sam Platt, of the company's staff of experts, has charge of the "exchange," and in a most able manner manages to take good care of his company's interests. As usual, the company's exhibit is fully up to the standard and exemplifies in a striking manner the perfection and high plane to which the Western Telephone Construction Company has brought its products. The principal feature of the exhibit is a 300-line, multiple transfer switchboard, connected so as to show the practical operation of a Western board of 1,000 lines or larger capacity. Immediately back of it is shown the Western combined distributing and test board and lightning arrester, recently designed by the company's engineers and fully described in the ELECTRICAL REVIEW some time ago. As stated at the time, this is one of the most complete, compact, and efficient pieces of apparatus of its kind ever designed.

ELECTRICITY AND MACHINERY BUILDING, TRANS-MISSISSIPPI AND INTERNATIONAL EXPOSITION, OMAHA, NEB.

A 200-line, regular type, table switchboard next attracts the visitor's attention, and a smaller 100-line board in a standard wall cabinet shows by its high serial factory number that it is evidently a favorite among the smaller exchanges. On two neat panels, covering each end of the exhibition space, are mounted the various types of wall sets, extension bells of various tones, repeating coils, testing sets and other accessories necessary or convenient for the perfect operation of an exchange. A complete line of the various parts entering into the construction of switchboards, telephones and apparatus is also shown, while the handsomely finished desk and cabinet sets, types A, B, C, D, E and F, are suitably displayed around convenient parts of the space. One of the special features noticed in the latest style switch tables is the ingenious locking device on the lever of the automatic circuit changer, whereby the operator is enabled to keep her telephone in circuit for any length of time desired.

Of the local firms, the Western Electrical Company, of Omaha, has quite an attractive exhibit, consisting of a large panel on which are mounted various styles of arc and incandescent circuit switches, circuit-breakers with automatic release and other switchboard equipments. A complete line of incandescent lamps is shown, as well as a great number of various articles in the way of general electrical supplies, in which the company has quite a western trade.

The General Electric Company, through its Chicago office, presents a most attractive collection of apparatus, covering the entire electric light, power and street railway field. Every branch of the business, in its smallest detail, is represented by at least some one piece of machinery, showing the great progress made, even within the past five years. The most prominent feature of the exhibit consists of a six-pole, 110-kilowatt railway generator, which is used as a motor and is coupled direct to a 12-pole, 150-kilowatt, three-phase alternator, giving 1,000 volts at a speed of 600 revolutions. A four-pole, 18-kilowatt, three-phase rotary converter is also shown in operation, demonstrating in a splendid manner the high state of perfection to which this kind of apparatus has been brought. The latest advance in street railway motor construction is shown in the specimens of railway motors, one each of the G. E. 52, G. E. 1,000 and G. E. 57 being exhibited. In the way of smaller machines, a four-pole, 20-kilowatt, 125-volt belted generator, and a two and one-half-kilowatt dynamo, 120 volts, are shown. Induction motors for 60 cycles, of three, five and 15 horse-power, attract much attention on account of their smoothness of operation and high mechanical finish. Back of the 200-ampere marble railway generator panel and the alternating panel can be seen a portion of the complete storage battery outfit, which is connected and serves as a practical demonstration of the great utility of this valuable adjunct to a lighting or power plant. A commodious booth, just back of the well known obelisk, built of fittings, contains a complete X-ray outfit, and in it visitors can enjoy the creeping sensation of seeing the bones of their own hand. Of the almost numberless other accessories and instruments, might be mentioned an eight-kilowatt and an 800-watt potential regulator, some of the latest types enclosed arc lamps, railway controllers, circuit-breakers, instruments for measuring and recording, transformers, automatic rheostats, cut-outs, sockets and what not, down to a simple porcelain cleat. During the exhibition Mr. R. A. Swain, of the Chicago office, will be in charge, and it is due to his energy and experience that the placing of the exhibit was done in such a prompt and systematic manner.



A Bird's-Eye View of the Grand Court, Trans-Mississippi and International Exposition, Omaha, Neb.

A Cable to Hawaii.

The Executive Council of Hawaii has signed a contract with the Scrymser Company, of New York, to lay a cable from San Diego, Cal., to Honolulu, and from there to Japan.

EXPERIMENTS ON INDUCTION COIL CONDENSERS.

BY ALFRED G. DELL.

The following experiments were made to determine the relation between an induction coil and its condenser.

The apparatus used consists of an induction coil and a separate interrupter with a condenser in its base, so arranged with a separate contact that the breaks were made entirely independent of the battery strength passing into the induction coil, a separate cell of battery being used to run the interrupter. The separate interrupter has switches arranged to throw in or out of use the condenser connected to it. The induction coil has an interrupter and condenser of its own, but in making these experiments its interrupter was locked so it could not move, and, of consequence, its condenser was out of use.

I tried the arrangement as described above, and found I obtained from the secondary of the coil fair and vigorous sparks when the interrupter was in use, and the sparks at break of the primary were very small. On throwing out of use the condenser, I found exactly the opposite; the sparks from the secondary were very minute, and the sparks at the break of the primary were large and bright. I attached in the circuit of the secondary a Leyden jar in shunt with the spark gap, and then, after removing the jar, I attached a Tesla coil. In both cases the condenser was without any effect; the electrical energy received being the same whether the condenser was in or out of use.

I also attached a double cathode Crookes tube to the Tesla coil, and failed to distinguish from the light received in a fluoroscope whether the condenser was in or out of use.

I attached several very sensitive Geissler tubes, one at a time, and examined the anodes and cathodes, striæ, and intensity of the light obtained. I failed to discover any difference in any respect, whether the condenser was in or out of use. It is evident that if there are any discharges at make of interrupter, they are not affected by the condenser being in use; neither has the condenser any influence on the striæ, nor the intensity of light obtained.

I now come to experiments where I found a difference in the phenomena. I attached to the secondary of the coil a Geissler tube made of six feet of glass tubing one-quarter of an inch in diameter, wound into a spiral of five and one-half inches of diameter; there being no bulbs around the electrodes; of consequence the discharges were confined to rather small spaces. The tube is inclined to be refractory to quite small discharges. I having found sparks too small to light it up fully.

With this tube I discovered a slight difference in the light attained, but not in the striæ or the anode and cathode. I, as a last test, attached two Crookes tubes. The first used would not receive the discharges when the condenser was out of use, nothing appearing but a faint glow, which I attributed principally to the discharges from the electro-static field surrounding the connections of the tube.

The other tube contains a lower vacuum, it being more suitable for a

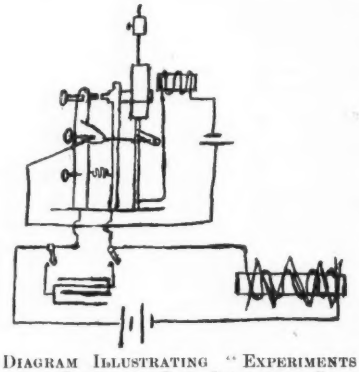


DIAGRAM ILLUSTRATING "EXPERIMENTS ON INDUCTION COIL CONDENSERS."

static machine, but with a spark-gap in series with the tube and coil, it gives X rays of considerable strength when the spark-gap is at its full length to hold the sparks, the X rays varying in strength with the length of spark-gap. This tube lighted up brightly with condenser out of use, but on opening a spark-gap in series I had, in a manner, no spark and the light disappeared. My deductions from the above experiments are that the condenser destroys the spark at break of the primary, which is necessary to preserve the platinum points and makes the spark in the secondary. If the arrangement used does not require a spark larger than the one obtained without condensers to break across an air space, the condenser is entirely without effect in the results obtained. Where an air-space has to be crossed the spark must be of sufficient length to pass it or there will be no discharge. I have noticed, sometimes, that in experimenting with Crookes tubes and a fluoroscope there would be a sudden dark space, a discharge having failed to pass, and I also noticed at such failures the spark at the break of primary was very bright.

From the above experiments, I think the cause of the dark spaces is fully explained. The extra discharges at break do not pass into the condenser; the dark discharges are the same as if there was no condenser in use. With Geissler tubes, that are sensitive, there are no dark spaces seen.

I will now give an experiment somewhat different from the above, hoping I will be pardoned for the digression. I have often noticed that when an interrupter, attached to the core of an induction coil, was in operation, and a spark-gap was in circuit with the secondary of the coil, that if the spark-gap was closed, or very nearly so, there was an interference of some nature with the running of the interrupter. I energized a coil from an exceedingly weak cell of battery, and found that the interrupter would run as long as the spark-gap was well open, but as soon as closed the interrupter would stop.

I do not propose to theorize concerning it; I only give it as a peculiar experiment. I depend upon experiments almost entirely for my information, believing they are the only reliable criteria.

If my experiments are of any benefit, my object in publishing them has been obtained.

Telegraph Poles in England.

Scattered throughout the British Isles there are over 7,000,000 telegraph and telephone poles, and as, taking the different railway and other companies into consideration, the General Post Office owns the greater part of these, a representative of London *Tit Bits* called on a gentleman connected with this big business for some statistics, which were given unofficially.

"Naturally," commenced Mr. ——, "the number of poles used in London and its neighborhood decreases year by year, but in the country fresh ones are being placed in position, and at the present time the telegraph poles governed by the Postmaster-General number about 1,007,000. The length of each one varies from 20 feet to 60 feet, and striking a fair average, the total would, if placed end to end, form a line of over 5,700 miles long.

"If we ran out of coal for our navy and could transport these poles to the ships, we could furnish them with an enormous amount of fuel, for they weigh between them over 2,000,000 tons — sufficient to provide 80,000,000 families with a week's firing. Attached to these poles are a certain number of insulators—those cup-like things that you see the wire twisted round. There are over 5,870,000 of them, and if placed on top of one another would reach a height of 450 miles, while their weight would be over 3,571 tons.

"These would last for years and years, but, owing to schoolboys and the roughs in the Black Country who make targets of them, we have to replace 30,000 every year; indeed, so serious has this practice become that the Home Office has to send circulars to schools and other buildings at stated periods on the subject, and the Postmaster-General would be grateful if *Tit-Bits* also warned its readers against this poor sport."

Dealing with the price of these insulators, our representative was unable to discover what the General Post Office paid, but was informed by a telegraph company that they cost between 4½d. and 1s. each, so that a fair average would work out at £150,000 for the system, and a loss of £750 annually through stone throwing.

"Needless to say," continued our informant, "that without wires these poles and insulators would be useless; therefore, to send the millions of telegrams from one end of the country to the other we require 280,000 miles of copper and iron wire. This is delivered to us in coils.

"The heaviest wire weighs 800 pounds a mile, and, roughly speaking, there are 84,000,000 hundredweight of these metals required. Yes, our stock is certainly an enormous one and we are, I believe, the biggest owners of wire in the world."

The National Telephone Company owns and uses 161,208 miles of wire in London and the country, while their insulators number nearly 10,000,000. At some of their central stations the "forms" erected over the buildings will contain as many as 216, while it is a common occurrence to raise one's eyes to a rack that contains a gross and a half.

At a meeting of the stockholders of the Dexter, Me., Electric Light and Power Company the following directors were elected: S. S. Ireland, A. P. Abbott, W. H Abbott, W. E. Brewster, Dr. C. H. Haines, Samuel Copeland, L. T. Waterman. The directors held a meeting and elected S. S. Ireland, president; A. P. Abbott, vice-president; W. H. Judkins, secretary and treasurer.

Electric Grooming and Clipping Machines.

The electric motor has become a necessary adjunct to every well appointed modern stable, whether livery or private, and horses are now groomed and clipped by electricity, with both neatness and dispatch.

The advantages of the application of the electric motor to grooming and clipping machines were early realized by the American Shearer Manufacturing Company, of Nashua, N. H., and its efforts toward supplying a demand for electrically-driven groomers and clippers has met with considerable success. Hitherto, however, it has supplied merely the machinery, exclusive of the motor, but owing to a demand which has arisen for complete grooming and clipping installations, it is now supplying the motor as well. In doing this, however, it has found it necessary to simplify in a large measure the driving mechanism.

Fig. 1 shows the No. 8 grooming and clipping machine, driven by a bipolar motor through double counter-shafting with conical and idle pulleys. This method, while it allows of the operation of two or more groomers and clippers from one motor, was by no means satisfactory, on account of the complication of belts and pulleys necessary, and when it became a question of furnishing both driving and operating machinery, it was felt that some more direct method of drive was needed. This was found in the small-power, moderate speed motors developed by the General Electric Company, which, in addition to its line of small-power induction motors, has also recently perfected a line of direct-current, small-power motors known as the C. A. type. These motors may be run in any position, either attached to the wall, set on a bracket, or hung from the ceiling, and have been found peculiarly adapted to drive the groomers and clippers of the American Shearer Manufacturing Company.

Fig. 2 shows the No. 9 machine complete with a one horse-power C. A. motor and automatic starting rheostat. In this case no floor space is occupied by the motor, the counter-shafting is eliminated, and the belting is reduced to a single belt from the motor pulley to the pulley attached to the flexible shaft of the groomer and clipper. The motor is fastened to the ceiling beams in an inverted position, and the counterpoise or balance arm is attached to a swivel on the motor case. The automatic starting box, also fastened to the ceiling, is of the reversing type, with the contact arms pulled in either direction by leather straps. This clipping and grooming outfit is singularly compact and simple, and requires almost no attention beyond an occasional oiling.

With the electric motor-driven

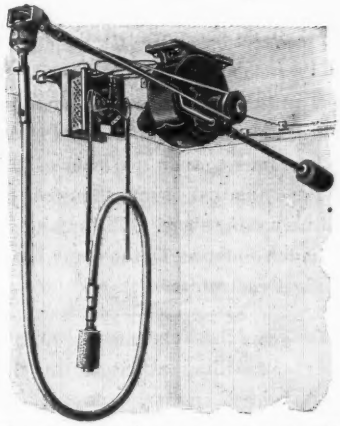


FIG. 2.—NEW METHOD OF DRIVING REVOLVING BRUSH WITH C. A. MOTORS.

groomer and clipper, a horse may be thoroughly brushed in about two and one-half minutes, and clipped in about 35 minutes.

The Cleveland Electric Company.

The Cleveland Electric Company, 14 and 16 Middle street, Cleveland, Ohio, has been organized to manufacture electrical specialties, including switches, cut-outs, head blocks, etc. A catalogue of their products will be issued in about 10 days. The officers of the company are W. J. Morgan, president; F. C. McMullin, vice-president; O. P. Fisher, treasurer; N. C. Stevens, secretary, and Frank A. Rogers, general manager.

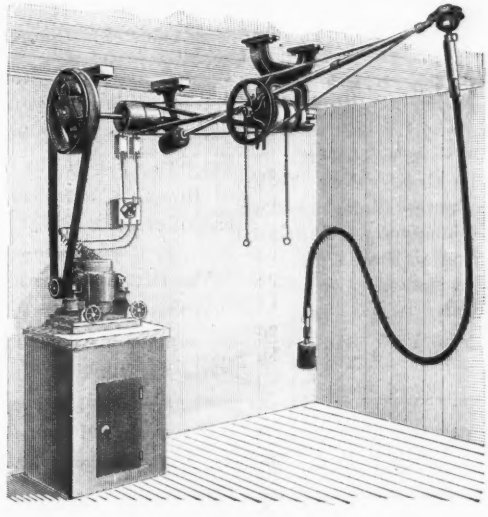


FIG. 1.—OLD METHOD OF DRIVING REVOLVING BRUSH THROUGH DOUBLE COUNTER-SHAFTING.

Telephones and Liquid Air.

Mr Henry Norman, the well known English journalist, in a recent article, entitled "America Revisited in War Time," in the July *McClure's*, speaks as follows regarding the use of the telephone here and in England:

"The observant visitor to America must be impressed first with the remarkable development of what may be called applied intelligence. Not only is there an extraordinary fertility of invention, but also, what is perhaps more striking still, there is apparently an instant readiness on everybody's part to make use of the things invented.

"From visit to visit, for example, I have observed a constant improvement in the telephone. The instrument has grown smaller, neater, more graceful, simpler, and easier to use. As it stands on an American desk today, it might be a flower-holder. In some of the best and most expensive parts of London to-day, you can not have a telephone put in your house at all. When you do, it is the ugly box arrangement of 10 years ago. I call upon a journalist friend in New York. Upon his desk stands an elegant little apparatus through which he converses every afternoon with Washington and Chicago. In a London newspaper office you might as well look for a machine for making liquid air."

Look Out for This Game!

[*From the American Machinist.*]

One of the latest games is to advertise for men as engineers, electricians, etc., and when replies are received inform the applicants that the subscription price of a hitherto unheard of journal must first be sent, as all applicants must be subscribers. It is a humbug which none of our readers would be apt to be caught by, but they might warn some others who are in outer darkness. The scheme hails from Cleveland, and is, perhaps, a variation of the oil swindling game.

TELEPHONE NEWS AND COMMENT.

There are 1,000,000 Bell telephones in service.

The New England Telephone and Telegraph Company has filed a certificate of an increase in its capital stock from $12,000,000 to $15,000,000. The debts and liabilities of the company amount to $3,505,404.

There is still merry music between the telephone subscribers and the company at Washington, D. C. It is not of a harmonious nature, however. It would seem to be a case where both sides could give a little to mutual benefit.

Some time ago the Central Union Telephone Company was granted a franchise by the City Council of La Porte, Ind. Notice of their action was duly advertised, and the company's acceptance was filed. The City Council now wants to withdraw the franchise, and the company will contest. The company has already begun arrangements for the new line.

The police board of Buffalo is putting in a telephone exchange for its own use. For 155 transmitters the Pennsylvania Electric Company bid $3.77 each and was awarded the contract. The Wilhelm Telephone Company, of Buffalo, was given the contract for 155 receivers at $2.25 each, 12 adjustable desk sets at $3.50 each, and 13 desk sets for the station house at $8 each.

The Drawbaugh telephone bill was passed in Philadelphia by a vote of 31 to 3, those against it being Messrs. Clay, Huey and Vare. By its provisions the maximum charge is to be $75 a year. Three per cent of the gross receipts are to be paid the city in consideration of the franchise, in addition to furnishing the city the free use of two ducts in its conduits for the laying of its wires.

This is the way the government tax on telephone messages is handled on the Pacific coast:

Commencing July 1, 1898, the United States Government places a tax of one cent on every long-distance message costing 15 cents or over. The telephone companies on the Pacific coast will charge, on the end of the month, to telephone subscribers using the long-distance lines the government tax of one cent on each message on which the company receives from 15 cents to 50 cents. On all messages on which they receive above 50 cents the telephone company will pay the tax and no charge to subscribers.

JNO. I. SABIN, President.

Electrical Review

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SPECIAL NOTICE TO ADVERTISERS.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue. NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

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A boiler explosion in a Buffalo, N. Y., manufacturing plant the other day killed seven persons and injured 36 others. With Niagara Falls current furnishing power to the plant in question, such a catastrophe would have been impossible.

Preliminary steps have been taken in the New York Municipal Assembly to compel all railroad companies operating within the city of New York to provide a seat for every passenger carried. Oh, lovely dream!

The telephone is playing a very important part in Cuba in the war with Spain. It keeps the army in front in instant communication with the headquarters and the shore base of supplies. It proved invaluable in the the first attack at Santiago in keeping the army and navy in close touch.

The ELECTRICAL REVIEW is authoritatively informed that the Chicago monthly, *Electrical Engineering*, has changed ownership, and that hereafter it will be published in accordance with a broad and independent policy, devoting especial attention to the telephone field. Heretofore this publication has been violently opposed to the anti-Bell telephone companies in its tone.

The work of improving the street lighting of the enlarged New York, now, with one exception, the greatest city of the world, goes on uninterruptedly under the direction of the Department of Public Buildings, Lighting and Supply. Last week 26 new lampposts were erected in the territory of the Greater New York and 24 lampposts were discontinued, a net gain of two lampposts. Thirteen lampposts were straightened out and 14 were carted away.—*New York Sun.*

Who says New York is not progressive?

We call the attention of our readers to the splendid half-tone engravings, presented in this issue, of some important features of the Trans-Mississippi and International Exposition at Omaha. The excellent results achieved by our engravers are due largely to the fine quality of the original photographs, which were made and copyrighted by Mr. F. A. Rinehart, the official photographer of the Exposition. We feel safe in saying that no better pictures than these of the Omaha Fair have appeared anywhere.

The application of an independent telephone company in New York to connect its exchange with the Central New York Telephone and Telegraph Company has been refused by Judge F. H. Hiscock, at Syracuse. The judge holds that a reasonable construction of the statute does not require one telephone company to supply connections with its system to another company so that the latter may utilize the connected system as part of its own and transmit thereover its own messages on payment of the merely nominal sum required of ordinary subscribers. The opinion is of much interest to the many independent companies.

For years the ELECTRICAL REVIEW has been calling attention to the short-sighted policy, adopted by many electric railways, of using too light a rail-bond for insuring full conductivity of the rail-return circuit. A casual inspection of the bonding now in use on the Brooklyn Bridge indicates another lapse into the old practice. Considering the vast traffic and the almost continuous procession of cars, it would appear that this road particularly requires the very best conductivity obtainable. But it is only another instance of the parsimonious policy, which for years has been a blot on the street railways of Brooklyn, extended to the track circuit of the Bridge.

The next great inroad of electricity into the realms of mechanics will be the myriad channels of usefulness in warfare, particularly in the performance of the multifarious functions on war vessels. Of course many duties are now shouldered by this nervous, throbbing young giant of the nineteenth century, such as lighting the vessel, signaling, operating searchlights, ammunition hoists, ventilating, etc. But there is a multitude of other functions now performed by steam, hydraulic or pneumatic appliances, which ere long will be superseded by electric devices. Electricity in warfare will then become a study in itself, and, we believe, the chief and most important one of the cadet's course.

PERSONAL.

Prof. William D. Marks, who is well known in the electric lighting field, has been elected president of the General Electric Automobile Company, of Philadelphia.

Prof. Harry A. Storrs, professor of electrical engineering at the University of Vermont, is superintending laying cables to submarine mines along the New England coast.

Mr. Clarence Livingston Burger, the patent attorney and expert, has associated with him in the practice of patent and trade-mark law Mr. Louis B. Adams, under the firm name of Burger & Adams. The offices of the firm remain in the Postal Telegraph Building, and Mr. Adams will continue the general practice of the law.

Capt. W. L. Candee, of the Okonite Company, and family, sailed on the Etruria for a six weeks' visit in London and on the continent of Europe, on Saturday, July 9. Passage had been engaged on the Berlin, which steamer, however, was taken by the government a few hours before she was ready to sail. A quick transfer was made by Mr. Candee and party to the Cunarder just in time.

Mr. James P. McQuaide, the well known electric conduit and cable manufacturer, of New York, entertained his friend, Mr. Fred A. Gilbert, the Boston electric light magnate, in this city last week. Mr. S. M. Hamill, the general manager of the Brush Electric Company, joined the party one evening, and old-time electrical reminiscences came thick and fast. Mr. Hamill is reported to have held the best hands—that is, told the best stories!

Mr. Paul W. Bossart, of the Pennsylvania Electric Company, of Marietta, Pa., returned from Buffalo last week well pleased with the handsome order he received for telephones from the police board of that city. Mr. Bossart is an old-time, though youthful, telephone man, and the apparatus of his company is most favorably known, the telephone transmitters being particularly well suited for police patrol work on account of their moisture-resisting qualities.

Lieut. Thomas N. Wood, president of the Ball & Wood Company, New York city, is now in active service in the navy, being attached to the "Gloucester," formerly the well known yacht "Corsair," which is under the command of Lieutenant-Commander Wainwright, formerly of the "Maine." Lieutenant Wood took

a prominent part in the destruction of Cervera's fleet, during which the "Gloucester" achieved undying fame. Lieutenant Wood, who is well known throughout the electrical industry, is a graduate of the Naval Academy at Annapolis and resigned his position in the regular service some years ago to enter upon commercial and engineering pursuits. He has now returned to the navy and will serve during the war with Spain.

Mr. A. K. Baylor, manager of the traction department of the British Thomson-Houston Company, Limited, of London, visited Milwaukee last week, and arrived in New York city the first of this week.

Major Webb C. Hayes, First Ohio Cavalry, was wounded on July 1, the first day of the battle at Santiago. He had been temporarily assigned to General Young's staff, and during the fight his horse was killed under him and he was hit. A late dispatch from the front says that he is out of the hospital and again ready for duty. Major Hayes is a son of ex-President Hayes and is treasurer of the National Carbon Company, of Cleveland.

A New Georgia Telephone Company.

The Eastman Electric Light and Telephone Company, of Eastman, Ga., has been granted a telephone franchise by the local city council. The company contemplates beginning work at once, and hopes to have an exchange completed in 60 days. The officers of the company are as follows: W. N. Lietch, president; W. M. Clements, vice-president; J. B. Caldwell, secretary and treasurer; James Harrison, superintendent.

Wall Street and the Electrical Stock Market.

The surrender of the Spanish army at Santiago and the extraordinary success of the popular war loan, which was oversubscribed more than 4 to 1, had little effect on the stock market. This has been explained on the ground that the usual Summer dullness is apparent and many business men and financiers are away on their vacations.

General Electric closed to-day at 38⅞, showing a fractional loss over the previous week. Western Union closed at 92½, indicating a slight gain.

On the Boston exchange American Bell closed at 273 asked, 272 bid. Erie Telephone closed at 69½ asked and 68¾ bid. General Electric preferred ended the week at 95 asked, 94 bid. On the Philadelphia exchange Electric Storage Battery common closed at 29½ asked and 29 bid.

The Edison Electric Illuminating Company of Boston has declared a quarterly dividend of 2 per cent, payable August 1 to stockholders of record July 15. Books closed July 15 and reopen August 2. This is an increase of ¼ per cent in the quarterly rate.

The transfer of the Edison Electric Illuminating Company of Brooklyn to the Kings County Electric Light and Power Company has been announced. The terms are not stated. The deal virtually consolidates all the electric lighting companies in Brooklyn, N. Y.

Wall Street, July 16.

The ELECTRICAL REVIEW has received from the department of electrical engineering of the University of Minnesota at Minneapolis "The Engineers' Year Book," Volume VI, 1898.

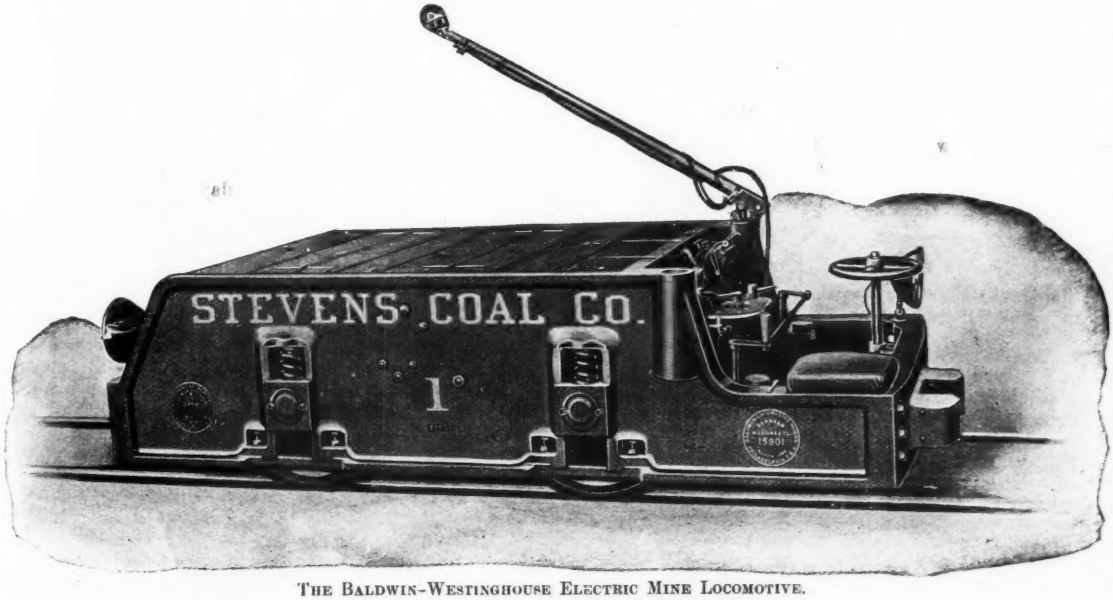
Baldwin - Westinghouse Electric Mine Locomotive.

The ELECTRICAL REVIEW presents herewith an illustration of the new type of electric mine locomotive manufactured by the Baldwin Locomotive Works, of Philadelphia, and the Westinghouse Electric and Manufacturing Company, of Pittsburgh. The locomotive frame consists of heavy cast-iron side and end pieces, securely bolted together and kept square by machined joints and accurately fitted shoulders. The frame is placed outside of the wheels, thus allowing all possible space between the wheel hubs to admit the greatest practicable width of motor. This is an important feature, and obtains maximum power on narrow track gauges and also permits ready accessibility to the journal boxes. The top of the locomotive is made of heavy planks, with hinged trap doors. The journal boxes have bronze bearings, with oil cellars for sponging, as in steam locomotive practice. The brake apparatus is simple and powerful. The operating platform is placed at one end, and is compactly and conveniently arranged, so that the motorman has all levers within reach without leaving the seat.

The entire machine, including the electrical apparatus, is supported on the journal boxes by helical springs, which prevent destructive pounding on the track and relieve the apparatus from shock. The locomotive is driven by two spring supported motors, one geared to each axle by single reduction gearing, running in oil lubrication in tight cases. These motors are especially designed for mining service, and are of the four-pole, steel-clad, enclosed railway type. The armature is of the iron-clad type, the coils being held in slots below the surface and secure from displacement, as in the most approved railway practice.

The controller is of the latest rheostatic type with magnetic blowout to prevent arcing at the contacts. It is provided with six speed changes and is operated by handles for starting and reversing. The rheostat or diverter is non-combustible, very compactly set up, and has large carrying capacity. The trolley pole is of special design, is reversible, and can be placed in a socket on either side of the frame, automatically adjusting itself to the varying heights of the trolley wire. The current connections are made by insulated cable. The locomotive is provided with all requisite minor electrical fittings, such as fuses, lightning arrester, main switch, and two electric headlights.

All sizes of the Baldwin-Westinghouse mine locomotive are designed to run at a standard speed of eight miles per hour when developing their full load tractive effort. With light trains the speed may be increased. These locomotives are made in seven sizes from 20 to 150 horse-power each and weighing from 7,000 to 34,000 pounds. The minimum track gauge varies from 24 inches to 56½ inches. On a level track the full load drawbar pull varies from 900 pounds to 6,500 pounds.



THE BALDWIN-WESTINGHOUSE ELECTRIC MINE LOCOMOTIVE.

A Well Equipped Power Building.

One of the largest and best equipped power buildings in the United States is the Manufacturers' Building, Providence, R. I. This building has accommodations for upwards of 60 manufacturing concerns, being particularly equipped with conveniences for the production of jewelry, specialties, etc.

The Manufacturers' Building Company have just purchased a 250-kilowatt, 500-volt Westinghouse Electric and Manufacturing Company's engine type generator, 100 revolutions per minute, to be driven by an Armington & Sims Corliss engine. This generator will supply power for the operation of motors in the various manufacturing departments of the building. The engineering features of this establishment are under the direction of Lewis & Clafflin, consulting engineers.

We have received from J. B. Taltavall, publisher, 253 Broadway, New York city, a pamphlet entitled "The Cure of Writers' Cramp and the Arm Troubles of Telegraphers and Ball Players," by S. H. Monell, M. D.

Western Electric Company's Improved Enclosed Arc Lamp.

The lamp illustrated is one of the latest designs placed on the market by the Western Electric Company. Its operation, simplicity in construction and its fine appearance evidence the activity of the makers, both in keeping pace with the most advanced engineering practice and in furnishing its patrons with apparatus reasonable in cost and satisfactory in service. In this lamp are combined short length, moderate weight, easy access to mechanism, ease of trimming and minimum number of parts.

Regulation of the arc voltage is secured by means of a single solenoid, having a tubular core through which the upper carbon passes, the clutch mechanism being attached directly to the lower end of the core and acting directly on the carbon. The solenoid has a plain series winding adapted for the particular current strength at which the lamp is to operate, which winding may be varied by changing the number of turns to suit the particular condition under which the lamp is operated.

The system of regulation is so perfect that the lamp maintains a practically constant current at all times, the voltage at the arc varying as the line voltage varies.

A special feature of the lamp is the new form of inner globe, entirely closed at the bottom and having a ground upper opening made flat and smooth to fit with accuracy against the top plate, through which the upper carbon is fed. The globe is held in position by a spring ring, which, in addition to supporting the globe, permits it to be forced slightly away from its seat in case of excessive pressure of the gases within the globe, thus relieving the pressure and avoiding cracking of the globe. Owing to the form and size of the new globe it is almost entirely free from opaque deposits, and such deposit as does form is not burnt into the glass, as commonly happens with the older small globes, but is easily removed by simple washing. The life of the inner globe is thus greatly lengthened, while first cost is no greater than for the old form.

In the Western Electric lamp a special arrangement of the supporting arms carries the lower carbon, which neutralizes the disturbing effect of the return current on the arc and secures an equal burning away of the carbons upon all sides, preserving a practically flat tip at a right angle to the axes of the carbons. This is specially important where these lamps are used for outdoor work with clear globes. Quick-break switches are provided on all these lamps, and the danger of a switch being left but partially closed or open is avoided. The switch is so designed that it can be operated by means of a pole from below.

The case surrounding the mechanism is held in place by two screws which are simply loosened, not removed, to permit removal of the case, which is then dropped down, exposing the mechanism. The casing on the rheostat is also removed by slacking two screws and allowing the case to drop down. Either portion of the case may be removed independently.

Carbons of one-half inch, seven-sixteenth-inch or three-eighth inch can be used in this lamp, the current being varied to suit the different sizes, the usual practice being five amperes for one-half inch, three to three and one-half amperes for seven-sixteenth-inch and two and one-half to three amperes for three-eighth-inch carbons. On circuits of 110 volts the lamps are adjusted to burn on 80 volts at the arc, the number of hours' life with one trimming depending on the size of carbons and current strength, with one-half-inch carbons five amperes, 130 to 150, with seven-sixteenth-inch carbons three amperes, 120 to 130, with three-eighth-inch carbons two and one-half amperes, 90 to 100 hours.

The lamp is 20 inches long and can be equipped with different styles of outer globes or shades to suit the taste or judgment of the purchaser. It can also be finished in different metals, such as brass, old copper, oxidized copper, black copper, silver or nickel.

It might be mentioned that the globe shown in Fig. 1, the standard form, contains the smallest air space consistent with the proper operation of the lamp, and will prolong the life of the carbon to the utmost limit. The egg and stalactite shapes having been designed to meet the demand for something more artistic, will, on account of the increased air space, not give quite as long a life to the carbons.

FIGS. 1, 2 AND 3.—THREE STYLES OF THE WESTERN ELECTRIC COMPANY'S MIDGET ENCLOSED LONG-BURNING ARC LAMP.

Manhattan General Construction Company's New Enclosed Arc Lamp.

The new improved types of enclosed arc lamps of the Manhattan General Construction Company, New York, are designed to burn in multiple on direct-current circuits of from 90 to 250 volts, and in series on circuits of from 200 to 600 volts, and on alternating-current circuits of any frequency from 90 to 130 volts.

There has been introduced the novel feature of lowering the bulb down through the opening in the bottom of the outer globe on double telescoping rods, as shown in Fig. 3. The inner bulb and carbons are thus brought in full view below the lamp; and after retrimming, the device, on being raised, automatically locks in position. To lower the trimming device it is only necessary to press the knob on the bottom of the lamp.

The carbon sheath is removed as heretofore, but the current is fed to upper carbon directly through the sheath, in place of a separate brush box as formerly. Contact between sheath and inner tube is made through metal balls contained in the sheath. Magnetism automatically attracts these balls against the sides of the inner tube, and assures perfect contact. The cap used in the new Manhattan lamp is provided with a gas chamber, which materially lengthens the life. This cap is made under patents of L. B. Marks and Moses S. Okun. The mechanism shell may be lowered while the lamp hangs in position by removing the trim and outer

globe and giving the central cylinder a quarter turn, when the shell may be removed and current adjustment of the lamp changed.

The adjustment of the rheostat for voltage may be made by loosening set screws and lowering the split canopy at the top, as shown in Fig. 4 (A).

FIG. 1.—MANHATTAN ARC LAMP FOR INSIDE SERVICE.

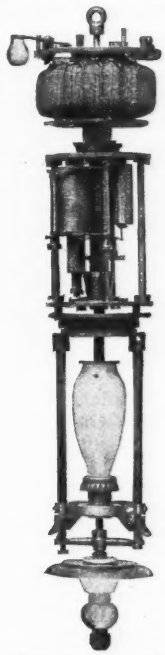


FIG. 2.—MECHANISM OF MANHATTAN ARC LAMP.

FIG. 3.—MANHATTAN ARC LAMP WITH INNER GLOBE LOWERED.

The claim for the Manhattan lamp has been its simplicity, and that it was made up entirely of heavy castings. It will be found, however, that all the mechanism below the armature has been dispensed with in the improved lamp, and that the only moving part in the lamp is the armature, inside of which, however, is a ball clutch.

The armature and clutch may be removed from the lamp while it hangs in position by undoing one nut. The brush box has been entirely eliminated from the new lamp. One of the sources of danger to short arc lamps has been that the arc is so close to the mechanism there is a likelihood of burning out of the magnet. This has been provided against by the use of a ventilated magnet, and a current of air is constantly passing between magnet and central tube. In the new lamp there is no air chamber, and a loose fit is maintained between all of the parts. All of the parts are loose fits and may be removed with the fingers, and to entirely remove all of the parts of the lamp it is only necessary to remove two nuts.

The manufacturers announce that the number of operations to assemble the lamp is reduced from 20 to 6.

To remove the magnet the lamp may remain hanging in position (see Fig. 4); take off globe and frame G, unscrew cap F, when there may be taken out the armature E, then unscrew the nut D, and the central tube C and the magnet B may be slipped out of the frame A, and every part of the lamp is separated. The lamp may be assembled by the reverse operations. In taking apart the lamp no insulation of any kind is disturbed.

The new lamp is said to burn within very narrow limits and with great steadiness.

The rapid extension in this country and abroad of the use of circuits of from 220 volts has caused a large demand for lamps to burn in multiple on such circuits. The new type Manhattan lamp has been designed for such service, and the mechanism of the lamp is exactly the same as the lamp above described, and the same lamp can be transferred from a 110 to a 220-volt circuit by the substitution of another coil and rheostat and a change of the nut holding the armature. The same standard new type Manhattan lamp is also arranged to burn two or more in series on circuits of from 200 to 600 volts by a change of the magnet coil.

The new type Manhattan alternating enclosed arc lamp contains a different form of mechanism, but the trimming device, outer globe, gas check plug, carbon sheath and shell are the same as used on the direct-current lamp, and these parts of the two lamps are interchangeable. The trim of the old type Manhattan lamp is also interchangeable with the new alternating lamp.

There is probably no apparatus in the electrical business that has received more serious attention by designers and inventors than the production of a commercial alternating lamp.

a b c d e f g

FIG. 4.—PARTS OF MANHATTAN ARC LAMP.

The development of the enclosed lamp for direct-current circuits has naturally caused much experimenting to be done with enclosed alternating lamps, and it seems as though the improvements in mechanisms brought about by enclosed lamps have enabled those experienced in lamp construction to produce lamps that would be acceptable both commercially and electrically.

The history of the different types of enclosed alternating arc lamps has been that, while they could be made to burn with satisfactory efficiency, it has been impossible to produce lamps that were noiseless with a substantially constructed mechanism that would operate with perfect reliability.

While the mechanism of the alternating lamp is of a different type than the standard Manhattan direct-current lamp, the clutch is the same.

The Manhattan company state that they have been working on this lamp for nearly a year, and have put the same through continuous commercial tests, and now announce that it is economical and reliable and starts up quickly and without chattering, will run without variation of current, and quietly, from 100 to 130 volts where such variation is found to exist, without readjustment. The lamp will burn 100 hours with one nine and one-half-inch by one-half-inch upper and one six-inch by one-half-inch lower carbon, and the unburned portion of the upper may be used as a lower for the next run. On circuits of 100 volts, 6 amperes, the lamp consumes 450 watts. The length of the lamp is 29 inches.

The lamp may be adjusted by a simple change of connections on the top plate for circuits of from 7,200 to 17,000 alternations, and has a range of adjustment for voltage of from 90 to 130 volts.

The outer globe is suspended on a white enameled ring about seven and one-half inches in diameter, and being directly over the arc acts as a reflector and materially increases the efficiency of the light. The carbon sheath is removable from the lamp, which is an excellent feature.

The Manhattan lamps are manufactured under patents of the Marks Enclosed Arc Light Company, Moses S. Okun, Max Harris and others.

Fig. 1 shows the inside service lamp for both direct and alternating circuits.

THE APPLICATION OF ELECTRICITY TO STEAM RAILROADS.

READ BEFORE THE AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION, SARATOGA SPRINGS, N. Y., JUNE, 1898, BY D. W. BRANGS.

The paper that I presented to this association at Old Point Comfort last year was an outline of the possibilities which might be put to practical use on various steam railroads in this country. The practical results accomplished in this line of work for the past two or three years stands preeminently before the American railroad man, not as an illusion, but a fact.

In reviewing this subject and bringing before you the many advantages that can be obtained by the use of electricity for railroad traction, it is safe to say that the possibilities in the near future will overstep expectations of even the most sanguinary engineer. My object to-day is to bring before you to review briefly as possible the various methods by which electricity can be applied for heavy railroad work.

The transmission of electrical energy is an important feature of electric traction, and by means of three-phase alternating system, which within the past three or four years has been developed to that extent, it is possible to generate and transmit it for long distances economically and efficiently. As regards the generating of this three-phase alternating current, the method of transmission is quite within the practical limits to produce as high potential as 20,000 volts, or it may be generated, say, of 200 to 500 volts. In the latter case, to secure economy of transmission for long distances, it would be passed through step-up transformers, and the voltage could then be raised to whatever potential desired, and so transmitted over the lines, then passed through step-down transformers and the voltage reduced to whatever might be suitable for the purpose at hand.

To derive direct current from alternating current, a combination alternating and direct-current machine, called a rotary converter, is used.

The efficiency of a three-phase transmission and rotary converter system may be considered 80 to 85 per cent, and it is within the limits of the present practice to operate railways 50 miles from the source of supply.

The current now generated at Niagara Falls is being transmitted by the three-phase alternating system, and transmitted at 10,000 volts to the city of Buffalo, and is used to drive cars between Niagara Falls and Buffalo, as well as for other useful work.

Touching the value of electricity for railroad work, the question of cost of operation is, of course, very important, and I think it may be fairly said that from the indicated horsepower of the engine to the mechanical energy at motor car, the efficiency of transformation will be from 50 per cent to 55 per cent. Steam locomotives, including all losses, give about the same net efficiency as applied to hauling the trains. Assuming an equal net efficiency by both systems, you would have the advantage in the electric traction of the compound condensing engine, cheaper coal, and a type of boiler enabling you to burn your fuel to the best advantage.

Roughly estimated, I believe that a ton-mile can be operated by the electric system for less than one-half the cost for fuel and the total cost of electric power, including all power station expenses, would not exceed three-fourths the cost of coal for the steam locomotives.

Of the various systems now in use, the most popular seems to be the third-rail system. The first extensive road equipped in this manner was the Intramural Elevated Railroad at the Columbian Exposition, 1893. The demonstration made at that time encouraged the owners of the Chicago elevated road to adopt electricity.

They discarded their steam equipment entirely, and with the exception of some difficulty they had in the beginning, from the fact that the motors were too light for the work, have been running successfully ever since. The experience gained by the operation of the Chicago road during the last two years has thoroughly established the economy and desirability of using the electric motor for elevated service. The subject is of special interest at this time, because of the adoption of electricity by the elevated railroads of Brooklyn, and the probable adoption of electricity by the Manhattan Railway, New York city. All elevated railroad construction is practically on the same plan, the structure being made of steel girders, supported on posts at intervals, with wooden tiles laid upon iron stringers; an ordinary tee rail spiked to them.

The trains are usually composed of five cars, weighing when loaded about 100 tons, drawn by a locomotive weighing 23 tons, with about 16 tons of its weight on drivers. These trains ordinarily make their schedule speed of 13 miles an hour, but during the busy hours of the day drop down to about nine or ten miles an hour.

There are two reasons for the adoption of electricity for elevated service; one to reduce the cost of operation, the other to increase its schedule speed to the utmost limit.

The increased rapidity in the movement of the trains will, for the same service rendered, reduce the train expenses very materially. The decrease in the running time of the trains must be made principally by stopping and starting, which means greater acceleration. Some recent acceleration tests have been made of standard car motors, which are 40 per cent better than could possibly be obtained with steam locomotives.

During the past year some practical acceleration tests were made with the standard American railroad type of car provided with four 50-horsepower, 500-volt, 90-ampere motors and mounted two on each of the trucks. On each armature shaft was a 33-toothed pinion meshing into a 52-toothed gear fixed to its respective axle. The total weight of the loaded car was 25 tons, including trucks, motor and passengers. The only departure from the ordinary practice was to reduce the gear ratio and use a controller which would admit sufficient current to give the required starting torque. The acceleration obtained was at the rate of 30 miles per hour at the end of 10 seconds. Five seconds after the controller handle was moved the car had obtained a speed of 19 miles per hour; at the end of 10 seconds, 30 miles per hour; 15 seconds, 35 miles; 20 seconds, 38 miles, and 25 seconds, or five seconds less than a half a minute, a speed of 40.5 miles had been obtained.

These figures convey no real idea of the rapidity of the start; however, a comparison with acceleration on steam roads may serve to bring out this point. An ordinary train seldom exceeds a speed of 10 miles per hour at the end of 10 seconds; just one-third the speed attained by the test car. In a similar test with a Manhattan Elevated train at the end of 20 seconds the speed was only 13.5 miles per hour, during which time 198 feet had been covered against 38 miles and 356 feet in the case of the electric car.

The sensation due to these rapid starts was not unpleasant, and, as the starting was perfectly smooth, even while standing in the car, one would not be inconvenienced by this rapid acceleration that is now the case with trains drawn by slow-starting locomotives.

The Brooklyn Elevated Railway Company are equipping their roads with what is known as the multiple unit system. This invention is the product of that eminent and pioneer railway electrical engineer, Frank J. Sprague. I think it would be opportune to dwell on this system for a moment. Each car is equipped with its complete complement of motors, controllers and air-brake apparatus.

Each controller is operated by a little pilot motor, whose movements in the direction of on or off position are determined by an electric current sent to it through wires leading from the operator on the front end of the train. There are certainly advantages to be gained by the use of this system; having a motor on every axle and having some method of simultaneous control of all motors, particularly independent equipment, unlimited length of trains, high tractive accelerated effort, reduced strains, smoother motion, etc.

As regards the use of this system for heavy train service, I see no reason why it could not be used to the very best advantage. The making up of trains for the various demands made upon the railroad companies for quick and effective service for all length of trains and the convenience by which such trains could be handled, would make it appear as though the multiple unit system would be applicable to all kinds of suburban and interurban service.

I wish to state briefly some well settled facts in reference to the electric motor. The dynamo or motor (interchangeable terms for the same machine), variously proportioned to meet the conditions of duty imposed upon it, has a modern useful life of scarcely a score of years. The use of this remarkable machine as a generator of electricity preceded in a commercial way its use to any wide extent as a motor. Only 13 years have passed since it began to have any standing for stationery motor purposes, and it has been but nine years since the building of the pioneer Richmond Electric Railway, which gave the impetus to one of the most remarkable industrial developments which have afforded one of the main reasons for the glowing predictions of the future of electricity. The design and manufacture of the electric motor presents no peculiar difficulties. It can be built singly or in combination of any desired power per unit; it is reliable; it has a smoother torque than a locomotive and can be worked for longer hours; it can be controlled automatically, or at will, in one or more units, by very much less skilled labor. I consider its depreciation very much less than that of a locomotive; its cost is reasonable, and will be very much further reduced.

As regards the means and method of operating trains, whether by a third rail, the overhead trolley, the surface contact system, or whatever other way may be used, the problem is largely one of collecting the current; i. e., securing proper contact between the moving and the fixed conductor.

For very heavy work, whether the speed be fast or slow, the third rail has some special advantages. Almost any amount of current can, practically, be collected. In the third-rail system as in use on the Hartford & New Britain division of the New York, New Haven & Hartford, as well as that used in the present existing electric elevated trains, there is simply a plain surface of rail, and upon this bears a cast-iron shoe weighing 15 to 20 pounds, which is dragged along by the car. This method of collecting the current has not given the slightest trouble. The maintenance does not amount to anything to speak of, as the shoe lasts a year or more, and the only cost is that much cast-iron, of which they are made.

As regards the question of insulation or leakage likely to take place from the third rail, the experience of the elevated railroads of Chicago and Hartford has been that wooden blocks three or four inches high, in conjunction with the tie upon which they rest, afford ample protection.

As regards the success of the installation of the electric system on

the New York, New Haven & Hartford road, it may be of special interest to you to know that, previous to operating the trains by electric motors, the travel between New Britain and Hartford amounted to about 800 passengers per day (the steam service consisted of three-car trains, weighing in the neighborhood of 200 tons, while the electric motor cars weigh only 25 tons), and since starting the electric system traffic has increased from about 800 to 3,000 passengers per day. The public appreciate the vast difference between the clean, effectual electric service, with its absence of smoke and cinders, and the regular steam locomotive service. The comparatively frequent service, also, of course, is a great inducement.

In conclusion, I might say that motors or motor combinations can be built which will surpass in power and in tractive and speed capacity any steam locomotive which it is practical to construct and operate. The necessary power can be efficiently and effectively transmitted for reasonable distances electrically. Increase of traffic requirements and the spur of competition are continually making necessary improvements of a character favorable to change of motive power. Electrical locomotives and cars can be built with multiple motor, power controlled and individualized; they can be so arranged that two or more can be operated at will or automatically from either end and from any situation on the train.

An Injunction in the Suspended Switch Case.

Judge Thomas, of the United States Circuit Court, at Brooklyn, N. Y., handed down a decree on June 23 in favor of the plaintiff in the case of the Thomson-Houston Electric Company vs. John George Buehler, Frank H. Platt and the Columbia Machine Works. The suit involved the Van-Depoele patent No. 424,695, and the case was popularly known as "the suspended switch case." A perpetual injunction was issued, restraining the defendants from manufacturing apparatus infringing claims 3, 4, 11, 19, 20, 23, 25, 26 and 27 of the patent in suit.

Close Cable Contest.

The Board of Police Commissioners, of Buffalo, opened some bids for telephone cables recently. They were as follows, but contract was not awarded: Standard Underground Cable Company, of New York, $4,189.30; National Conduit and Cable Company, of New York, $4,164.17; Western Electric Company, of New York, saturated, $4,408 61, dry, $4,564.24; American Electrical Works, of Providence, R. I., saturated, $4,195.73, dry, $4,010.80.

Victor Telephone Apparatus.

The Victor Telephone Manufacturing Company, 166 to 174 South Clinton street, Chicago, are the manufacturers of a complete line of telephone apparatus of modern construction for exchange work and private line systems. In Fig. 1 is shown the Victor long-arm telephone transmitter, and in Fig 2, a telephone for long-distance and exchange work. The long-arm transmitter is a well constructed piece of mechanism, very sensitive, powerful, and clear in articulation. The head is made of hard rubber, which prevents absorption of moisture and the consequent packing of the carbon granules. This instrument is equipped with a 500-ohm induction coil.

FIG. 1.—VICTOR LONG-ARM TELEPHONE TRANSMITTER.

The Victor exchange telephone has been designed for use where a strictly first-class instrument is desired. The woodwork is quarter-sawed oak, and the battery box is constructed so as to use from one to three cells of ordinary wet battery, one above the other, thus doing away with the wide battery box commonly used. The generator and ringer are guaranteed to give a strong ring through 15,000 ohms resistance. This instrument is equipped with a Victor special double-pole receiver, with a hard rubber shell, compound magnets and a special device for keeping adjustment.

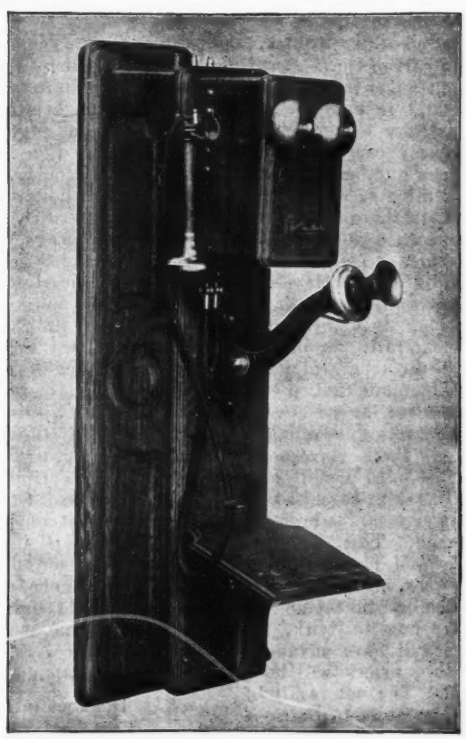


FIG. 2.—VICTOR LONG-DISTANCE AND EXCHANGE TELEPHONE.

The Electrical Engineer Institute of Correspondence Instruction.

It is gratifying to note the success which has attended the conscientious efforts of the Electrical Engineer Institute of Correspondence Instruction in its attempt to furnish to the profession of electrical engineering absolutely reliable and trustworthy instruction. Since the organization of this institute in the early part of the present year, every state and territory of our country, as well as many foreign countries, has furnished its quota of students, who have hailed with many a kind word of appreciation, the advent of the system which is rapidly proving to be almost ideal in its treatment of engineering subjects, and particularly those involving the manifold applications of electricity.

No doubt much of this success must be attributed to the standard set by the institute, since such eminent authorities as Prof. Francis B. Crocker, of Columbia University; Chas. F. Scott, the chief electrician of the Westinghouse Electric and Manufacturing Company; William Maver, Jr., the celebrated authority on telegraphy; Thorburn Reid, the well known designer of electrical machinery, and many others are included among those who have prepared papers for the courses of the institute.

Students and others who have investigated the methods of the institute and examined its series of instruction papers have expressed their complete satisfaction with its methods and its work. The institute has in this manner gained a large circle of friends almost immediately, and this circle seems to be ever widening. Many manufacturers of electrical apparatus have recognized the value of these courses of instruction to their employés and have consequently afforded the institute every facility in their power so that its representatives might present to their employés the methods of the institute. As a consequence students have been enrolled in most of these manufacturing establishments, and the list is growing daily.

In connection with the work of the institute, mention should not be omitted of the beautiful, artistic and interesting book of information, entitled "Can I Become an Electrical Engineer," which is sent free upon request, and which contains one of the most complete and perfect portrait collections of the prominent scientists and engineers who have succeeded in making the profession of electrical engineering what it is to-day. Any one at all interested in electricity should apply for this beautiful book at the home offices of the institute, 120 Liberty street, New York.

The Edison Light Company, of Grand Rapids, Mich., has declared a four per cent semi-annual dividend on its $200,000 capital stock.

THE IMPORTANCE OF PROPER METHODS OF ILLUMINATION.

READ BEFORE THE CANADIAN ELECTRICAL ASSOCIATION, MONTREAL, JUNE 30, 1898, BY F. A. BOWMAN.

In the last few years, since the electricity supply business has got beyond the stage of "systems" and controlling patents, there has been accumulated a great deal of most valuable information in regard to improvements in the generating and distributing plant, and to the best methods of realizing in practice the benefits from these improvements. From time to time there have arisen most animated discussions on the best system of rates, and methods of charging for the use of the current. The keynote of these discussions is the fact, brought to light by the accumulated experience of those companies that have been supplying electricity for some years, that the fixed charges grow steadily with the maximum demand on the plant, and that therefore the customers should be educated to use the current as many hours per day as possible. This is a matter of the most vital importance, and every central station man in this association should procure a copy of Mr. Arthur Wright's paper on "The Profitable Extension of Electricity Supply Stations," read before the National Electric Light Association at Niagara last year, and also one on the "Cost of Electric Supply," read by him before the Municipal Electrical Association in England, and to study them until he knows them by heart.

It should be distinctly borne in mind, especially by the smaller companies, that, to do a growing and really successful business, something more is necessary than to merely induce your customer to put in so many lamps, and then to get as much pay as you can from him for them. It is now clearly demonstrated beyond a peradventure that the margin of profit is as narrow in the central station business as in any other, if not a great deal narrower, and that, even when there is no competition from gas or a rival company, the closest economy and best management are necessary to yield a profit to the shareholders and provide for future contingencies. In view of this, the manager should realize that he must educate his clientele, and give them the best satisfaction in every way. Too many managers are satisfied when they have succeeded in persuading a customer to take a certain number of lights. If in addition they are giving full pressure at the lamps and a reliable service, they consider that their duty to both the company and the public is done. Now, this is a wrong principle. Attention should be paid to the purpose for which the light is required. Take, for example, a shop. The purpose for which it is to be used, its size, the height of ceiling, finish of the walls, kinds of goods to be displayed and sold, arrangement of counters and showcases—all must be noted and considered. It is useless to attempt to light a modern drug store and a ready-made clothing store in the same way and expect equally satisfactory results in both cases. The manager should be looked upon as an authority on methods of lighting, and if he gives the matter a reasonable amount of attention he very soon will be. He must remember that he is a dealer in light, and to be a successful one must know all about it—how it is best used and what are the latest fashions in it. If you go to a tailor for a suit of clothes, you expect him not only to sell you the cloth and to make up the suit so that it will fit you fairly well, but you expect him to be able to tell you what are the latest styles and fashions, and which of them are best adapted to the purpose for which you want them. Some managers will say, "Oh, I have a class of customers who do not care about fitting up nicely and will not spend money on it. All they want is that I will run the wires in and hang the lamps on cords as cheaply as possible." This man is mistaken. There is no community that will take electric light at all where a decided amount of education can not be carried out. Education of his customers is a very material part of the work of every successful manager in the electrical business, and is one of the principal reasons why the business can not be properly carried on by some one who has a number of other interests to look after as well. The manager must study this question of proper illumination so as to master the main principles necessary to a clear understanding of it. He must study his customers so as to know what their tastes and requirements are. He must carefully watch the advertisements in the technical journals and the catalogues that are so plentifully distributed, and many of which contain accurate and valuable information, and then correspond with the advertisers to see if the articles that strike him as suited to some of his customers can be brought within their reach. Then he must canvass carefully and patiently, and if he fails one year, must try again the next, because by that time he will know better how to work, his customers' ideas will have advanced somewhat, possibly prices will have dropped a little. The net result of all this is that he at last secures a contract for fitting up that is a pleasure to him to undertake and gives eminent satisfaction to the customer when done.

When first installing lights in the smaller towns and villages cheap, but not poor, work must be done to get the light introduced, but it should be looked upon as introductory only, and later on an earnest and continued effort be made to weed it all out.

A very common case that arises is that of a customer occupying a shop who is always making trouble about the bills. He has a certain number of lights strewed about without any definite arrangement, one switch to shut off the whole thing when he leaves, no shades, no reflectors, and the shop is half dark when all the lights are on, and if he is on meter and turns off a few to save money he has not light enough to do his work. The result is he is constantly growling himself and making others do the same.

When a case of this kind comes up the manager should go to him and suggest that by rearranging things he can have better satisfaction for less money, talk the matter over and work out a scheme that will put the light just where it is wanted, and add a few switches so that the groups of lights can be readily turned on and off. After the exercise of considerable tact and unlimited patience the customer will begin to be convinced and finally consent to refit. When this is done and the lights placed just where wanted, very possibly lamps of smaller candle power than before can be used on some of them. The result is a well lighted shop, which is a good advertisement for both the customer and company at a somewhat reduced cost to the customer and satisfaction all round.

The fewer lights the customer can install and yet get satisfaction from, the longer hours he will burn them all, and so tend to smooth off the peak of his individual load line; and the cheaper he can do it while still yielding a profit, the better for the company, as he is an advertisement and attracts others. Five customers, each of whom has 10 lights and uses them all three or four hours each night, are better than one with 50 lights who uses them all for one hour, and then turns off as many as possible.

It must be clearly borne in mind that the candle-power of a lamp and the amount of illumination we get from it are two entirely distinct things. The useful illumination is the amount of light reflected back to the eye by the objects on which the light falls, and the quantity and quality of the light so reflected is the important and controlling factor, not the candle-power of the source of light. The unit of illumination is the "candle-foot;" that is, a light of one candle-power one foot distant from the object to be illumined. This is a comfortable light for reading. The illumination is given by the formula:

$$\frac{\text{Candle-power}}{\text{Distance in feet}^2}$$

Thus, a 16-candle-power lamp four feet away gives one candle-foot of illumination.

The illumination yielded by a certain lamp can be very materially increased by the use of reflectors. The illumination of an object which, when below a small light, is one can be increased to 23 by a paper reflector, to 30 by a white glass one, to 64 by a polished one, and to 260 by a silvered glass hemispherical one. White reflectors throw a very nice, soft light and smooth off the edges of the shadows so as to produce a very pleasing effect. In using them it should be remembered that the ordinary law of reflection of light—viz., that the angle of reflection is equal to the angle of incidence—does not apply to them; but that the rays of light at whatever angle they may strike the reflector spring off from it in lines perpendicular to its surface. Consequently there should be no attempt at the mathematical shapes of optical reflectors, but large flat surfaces must be used. They should always be painted a dead white. The enameling of reflectors to have a shiny surface is a mistake; they do not give as good an effect to begin with and even the best rapidly lose their gloss.

The following table, due to Dr. Sumpner, gives the reflecting power of various surfaces and shows what a wide variation in the number of lights required for a given illumination may be caused by a change of interior decoration:

White blotting paper.	82 per cent.
Ordinary foolscap....	70 "
Newspapers.....50–70	"
Yellow wall paper....	40 "
Blue paper.....	25 "
Dark brown paper....	13 "
Dark chocolate paper.	4 "
Plain deal (clean)....40–50	"
" (dirty)....	20 "
Yellow painted wall (clean).....	40 "
Yellow painted wall (dirty).....	20 "
Black cloth.....	1.2 "
Black velvet.....	.4 "

When studying out the lighting of a given place we must consider whether we merely wish for a general sense of the space being nicely or brilliantly lighted, as in a ballroom or dining-room; or whether particular spots or objects need to be clearly illuminated, as the goods in a shop or the tables in a library.

The most important step to good illumination is to secure to the utmost extent possible that no bright spots or lines of light shall strike the eye. The moment the eye sees the source of light it closes itself up for protection from the direct rays and consequently can not receive as much of the light reflected from neighboring objects, and therefore does not see them distinctly. The following experiment will illustrate this very clearly: Take a shop with two show windows and hang the lights in one window about the level of the eyes, as is so commonly done, and in the other put the same number of lights in good reflectors close up to the ceiling. Now go across the street and note the result. In the first window the goods on exhibition are fairly well lighted, but it is a discomfort to look at them long and nothing is seen behind them. In the other window the goods are shown up beautifully and you can look at them as long as you wish and at the same time can see right back into the shop and see the goods on the shelves and counters.

In the smaller towns and in many cases in the larger ones the question of getting exactly the best illumina-

tion and effect from the lights must be subordinated to that of the cost both of the fitting up and of the current consumed. Also a certain amount of deference must be paid to the ideas of the owners.

Thus, in lighting show windows the very best method is to light them from overhead, or from the corners, with lamps in deep and powerful reflectors that will throw the light directly on the goods to be shown and will shield it from everywhere else. If it is necessary for the proprietor to be as economical of light as possible this can hardly be done, as these lamps are useless for general illumination in the shop. In such a case as this clusters under good flat reflectors on the ceiling of the window are best. These show the goods in the window very nicely, they make the front look much brighter, and at the same time throw a very considerable quantity of light into the front part of the shop where it is most required.

An exceedingly common case is a shop from 20 to 25 feet wide, 40 to 50 feet deep with two show windows, the ceiling being from 10 to 12 feet high, and used for dry-goods, tailoring, groceries, etc. A very good arrangement for this is to put a three-light cluster and flat reflector in each window, and three similar three-light clusters down the center of the shop. The main switch should be placed at a convenient spot near the door by which the employés enter and will, of course, turn on the lights. Another switch should then be arranged to turn off the window lights, and another to turn off two lights in each of the clusters in the center. This will be found to be a most convenient and economical arrangement for the customer, who can proportion his light to the weather and amount of business doing. While the central station man will find that, if the shop is open in the evenings at all, the whole of the lights will be on long enough to cover the maximum demand or standing charges.

These clusters should not be more than 10 feet 6 inches from the floor. Were these lights raised to 15 feet the direct light from them would be reduced one-half, calling for double the number to produce the same illumination, but since in this case the reflection from the ceiling and walls would be somewhat increased, probably an increase of 50 per cent in the number of lights would be sufficient.

Drug stores generally call for very special treatment, and the lighting must be made to harmonize with and to show off the fittings. Brackets on the top of the shelving and a handsome electrolier in the cent r are generally very acceptable, but as the result desired is more in the way of brilliant effect than of mere illumination for the showing of goods, each case must be studied out to suit the purse and the tastes of the persons concerned.

In the matter of churches the great desideratum is the even distribution of the light, with absence of shadows and the total avoidance of all spots or lines of light that will strike the eye of the congregation or of the minister, especially during the sermon. The minister, the choir and the organist, of course, require plenty of light, and it often calls for considerable ingenuity to supply their needs without having a bank of lights most unpleasant to the congregation. If such a group of lights can not be avoided it should be provided with a switch within convenient reach so that it can be turned out during the sermon. In Anglican and Roman Catholic churches, which have chancels separated by an arch from the main body of the building, the lights can often be arranged on this arch so as to be entirely hidden from the congregation, and yet throw a very pleasant light on the choir and reading desks.

Lodge rooms should be well lighted, and as they are often finished in very dark colors this is a difficult matter. The lights should be divided into groups controlled by switches, and those at the desks of secretary and treasurer are often wanted to be independent of the others in the room. A dimmer is a valuable addition, and should be arranged to control all the lights except those just mentioned. It should be a regular theater dimmer of ample capacity. Lodges are not, as a rule, paying customers, because their use of the light is irregular, and the income per light from them very small. Nevertheless, it pays to give a good deal of attention to the fitting up of them, because many get educated to good lighting through them whom it would be difficult or impossible to reach in any other way. It will require a good deal of work to get the first one well done, and especially to get the dimmer introduced, but after that it will be comparatively easy.

Persistent Advertising the Kind that Gets the Business.

Two weeks is too long a time between advertisements. Where the store has a daily at its command, there are sometimes reasons why it is not necessary to have an advertisement every day; but even in the daily I believe that the very best plan of advertising is to miss as few issues as possible without saying something. I do not think the merchant who advertises every other week is going to get anything like the advantage from his advertising that the merchant who advertises every week will get, no matter how attractive the every-other-week advertisement may be made. It is the persistent, frequent advertising that is, nine times out of ten, going to get the business.—*Chas. F. Jones, in Printers' Ink.*

The entire capital stock, amounting to $25,000, has been subscribed for the street railway at St. Albans, Vt., and work on the road will be begun in the near future.

OUR CANADIAN LETTER.

BARRIE, ONT.—The town will install an up-to-date fire-alarm system.

IROQUOIS, ONT.—A proposition to furnish electric light has been made by Mr. Keefe.

MANIWAKI, QUE.—An electric light plant will likely be installed for public and private lighting.

LONDON, ONT.—The City Council has decided to call for tenders for a municipal electric light plant.

THOROLD, ONT.—The ratepayers will be asked to sanction a loan of $7,000 to extend the electric light plant.

SHAWVILLE, QUE.—A joint stock company is being formed to construct electric light and waterworks systems.

WALLACEBURG—The local electric light company has agreed to install an incandescent plant within eight months.

WOODSTOCK, ONT.—Improvements are to be made to the fire-alarm system, including four miles of iron or copper wire.

LENDSAY, ONT.—The telegraph and electric light companies will probably be asked to lay their wires under ground.

CHARLOTTETOWN, P. E. I.—The Charlottetown Light and Power Company was granted incorporation at the last session of Parliament.

BRANTFORD, ONT.—The City Council has decided to dispense with gas for lighting purposes and will invite tenders for electric light; also for installing an electric light plant to be controlled by the city.

ORILLIA, ONT.—Tenders are invited by the town for a street lighting plant, an incandescent lighting plant, power service and steam plant. Particulars from Town Clerk or R. J. Clarke, consulting engineer, Toronto.

LUCAN, ONT.—Dr. Shaw is making arrangements to build telephone lines to the neighboring villages. It is understood a line is first to be built to Southgate, in London township, and afterwards to Saintsbury and Mooresville.

BRANTFORD, ONT.—The Fire and Light Committee have abandoned the proposal to install a municipal lighting plant, and have recommended to have a street lighting contract entered into with the Brantford Electric and Operating Company. J. A. C.

Montreal, July 10.

ELECTRIC RAILWAY NOTES.

Business on the Montpelier & Barre, Vt., Electric Railroad, which has been running about two weeks, is good, and rapidly increasing.

Engineers have commenced the survey of the Burlington & Grand Isle Railroad, which is to run from Burlington to Grand Isle, Vt. The motive power will be electricity.

The Toledo, Ohio, Traction Company is in receipt of 14 new cars to be run only on the long and short belt lines. The cars are the same color as the Traction standard cars.

The Janesville Street Railway Company, Janesville, Wis., have done a larger business for the month of June this year than at any time during the same month since Superintendent Cummins has been in charge.

The directors of the Lansing, Dexter & Ann Arbor, Mich., Electric Railway have reduced their demand for a bonus of $25,000 to $10,000. Citizens agree to give $5,000, and may raise it to $7,500. Mason is likely to get the road.

The longest electric railway in the world, it is said, is that operated between Kenosha and Waukesha Beach, both in Wisconsin. This line is 62 miles long, and arrangements have been made by the Milwaukee Electric Railway and Light Company to run chartered cars from Milwaukee to Waukesha Beach.

A deed of trust, or consolidated mortgage, has been entered for record at the office of the clerk of the Corporation Court by the Lynchburg, Va., & Rivermont Street Railway Company, conveying all of their property, including light and power plant and street railroad, to Charles M. Blackford and F. S. Kirkpatrick, trustees, to secure $100,000 of bonds issued to cover two mortgages, one of $40,000 on the lighting plant and the other of $60,000 on the railroad and power plant.

The stockholders of the Winchester & Strasburg, Va., Railroad Company elected the following directors recently to serve during the ensuing year: Messrs. John W. Garrett, Baltimore; John W. Emmert, Hagerstown; Albert Baker, James B. Russel, Winchester, and Andrew Bowling, Staunton, Va. The directors re-elected Mr. John K. Cowen, president, and Mr. W. H. Ijams, secretary and treasurer. The Winchester & Strasburg Railroad is operated by the Baltimore & Ohio, and extends from Winchester to Strasburg.

ADVANCE INFORMATION

New Electric Railways.

MORGANTOWN, W. VA.—Another charter has been issued to the Central Railway, of West Virginia, for the purpose of building a railroad from this place to Charleston; subscribed capital, $100,000; the stockholders are Thomas E. Davis and George M. Whitescarver, of Grafton; Robert T. Devries, of Wheeling, and John W. Mason, of Fairmont.

BRANCHPORT, N. Y.—It is reported that the electric road will be extended to Pulteney.

KANSAS CITY, MO.—The Central Electric Railway Company has been incorporated; capital stock, $1,000,000; incorporators, W. M. Reid, E. S. Yeomans, E. G. Vaughan, T. S. Groves, R. R. Conklin, William C. Scarritt and S. M. Jarvis.

VALLEY JUNCTION, IOWA—Ground has been broken for the extension of the street car line to this place. It will be completed by September.

READING, PA.—It is the intention of the projectors of the Allentown & Kutztown Electric Railway to extend the line to this city next year. The road is being built from Allentown to the Keystone Normal School, just outside the borough limits of Kutztown.

ATLANTA, GA. — The Lakewood Electric Railway, about three miles in length, has been leased to the Consolidated Street Railway for a term of years, with option to purchase the property under certain conditions.

KANSAS CITY, MO.—Articles of incorporation of the Central Electric Railway Company have been filed in the recorder's office. The capital stock of the new company is placed at $1,000,000. Incorporators: Samuel M. Jarvis, of New York city; William M. Reid, Edwin S. Youman, E. G. Vaughn, Frank S. Groves and W. C. Scarritt, of Kansas City, and Roland R. Conklin, of New York.

ALBANY, N. Y.—The Union Railway, of the borough of the Bronx, will open its branch from Mt. Vernon to New Rochelle, August 1. It runs to Glen Island.

HARRISBURG, PA.—A reorganization of the Harrisburg and Mechanicsburg Electric Railway Company, which is operating lines between this city and New Cumberland, Riverton, Wormleysburg, West Fairview and Camp Hill, in Cumberland County, was effected here a few days ago by the election of the following directors: Spencer C. Gilbert, Harrisburg, president; B. F. Meyers, W. L. Gorgas, Lyman D. Gilbert, Harrisburg; J. J. Baughman, New Cumberland; George W. Cumbler, Steelton; M. C. Kennedy, Chambersburg; E. J. McCune and George H. Stewart, Shippensburg.

PETERSBURG, VA.—The Piedmont Traction Company has been formed to build an electric street railroad in the city.

CHICAGO, ILL.—The Chicago & Milwaukee Electric Railroad Company has just opened its line for traffic between Highland Park and New Chicago.

STEVENS POINT, WIS.—The Almond, Stevens Point & Northern is the name of a new railroad company intending to operate a line of road from Almond to Stevens Point, a distance of 21 miles. The capital stock is $80,000.

Electric Light and Power.

HARRISBURG, PA. — The Beacon Light Company, of Darby, the Beacon Light Company, of Ridley Park, and the Beacon Light Company, of Glenolder, have been incorporated. Each has $1,000 capital and the directors are George C. Hetzel, Ridley Park; J. F. Cochran, Jr., George S. Howell and Thomas S. Hall, Chester, and E. F. Davis, Brooklyn.

TOLEDO, OHIO—The Toledo Heating and Lighting Company has been incorporated with a capital stock of $125,000. The incorporators are H. T. Yaryan, H. E. Marion, Irving B. Hiett, T. W. Childs, R. R. Lee and George H. Beckwith.

MINGO JUNCTION, OHIO — The Mingo Light Company has been incorporated by Benjamin L. Hirshfield, Joseph May, William May, Louis W. May and Thomas M. Loup, to maintain an electric light plant in Mingo Junction; capital, $5,000.

ALBION, N. Y.—The Albion Power Company has been incorporated to operate in the towns of Carlton, Gaines and Albion, Orleans County; capital, $50,000. Directors: Raymond D. Johnson, of 14 Fargo avenue, Buffalo; Sanford T. Church and Albert Culver, of Albion, and others.

SAULT STE. MARIE, MICH.—The Michigan Lake Superior Power Company has been incorporated with a capital stock of $500,000.

CLOVER, S. C.—The Clover Manufacturing Company's electric plant will be overhauled and improved.

BARNESVILLE, GA.—An electric lighting plant has been established in the Samuel Benedict Memorial School.

ABBEVILLE, S. C.—The Abbeville Cotton Mill Company contemplates putting an electric lighting plant in its mill.

SPARTANSBURG, S. C. — A new electric plant is to be erected, operated by water power.

FAYETTEVILLE, ARK.—Hope and Prescott are to have new electric light plants. A 1,000-light dynamo is to be put in at each place. Hope will have 25 arc lights on the street and Prescott 25. A. L. Dyke, electrical engineer and contractor, of this city, will probably be supervising engineer in the work.

GALVESTON, TEX. — The Paris Light and Power Company, of Paris, Lamar County, has been incorporated; capital stock, $60,000; purpose, manufacture and sale of gas and electricity for light, heat and power. Incorporators: D. H. Scott, B. J. Baldwin, Jr., T. J. Record and John A. Porter.

MEXICO, MEX.—The well known and reputable firm of G. & O. Braniff, of this city, has just secured the contract for the electric lighting of the city of Leon.

REDLANDS, CAL.—The Southern California Power Company, of this place, has elected the following officers: Henry Fisher, president; Geo. H. Barker, vice-president; H. H. Sinclair, general manager; J. B. Miller, secretary.

New Telephone and Telegraph Companies.

BUFFALO, N. Y. — The Buffalo Telephone Company has been incorporated; capital stock, $5,000; incorporators, C. H. Parmelee, Robert Foote, W. J. Thom and others. The company will construct and operate a telephone and telegraph line between this city and Sheridan and other points.

BOLIVAR, N. Y.—The Western New York & Pennsylvania Telephone Company are stringing a new line between this place and Wellsville.

CHESTER, ILL.—The entire plant of the Chester Mutual Telephone Exchange has been transferred to A. G. Groon.

CLAYVILLE, N. Y.—A new telephone line is about to be erected, running from A. J. Green's, thence to Risings, Rider's and Cedar Lake. It will be run in connection with the Paris telephone line.

SPARTA, TENN.—The Gainesboro Telephone Company has just completed its line from this place to McMinnville, with offices at Doyle, Quebeck, Bone Cave, Goodbars and Increase. This furnishes connection for the upper country with the Dixie line to Tracy City, and extends over nine counties, with proposed extensions into other counties. The equipment is made by the American Electric Telephone Company, of Chicago, and the service is perfect.

SEYMOUR, IND.—Charles Leininger was granted permission to erect a telephone line along the Seymour, Jonesville & Waymansville gravel road.

NEW HAVEN, CT.—The stockholders of the New England Telegraph and Telephone Company voted to increase the capital stock of the company from $12,000,000 to $15,000,000, as recommended by the directors.

MOORESBURG, TENN.—The telephone line from Sneedville to this place has been completed, giving this community connection with all upper East Tennessee.

MARYSVILLE, OHIO—N. E. Liggett, manager of the Home Telephone Company, has been in Chicago and made arrangements to put in the long-distance telephones connecting this city with many of the larger cities.

DETROIT, MICH.—The Detroit Telephone Switchboard and Construction Company has secured the contract for a 5,000-telephone exchange at New Orleans and will begin work there September 1. The independent company down there was formed by some of the stockholders of the Detroit Telephone Company and a number of local capitalists. Manager Ahern will superintend the construction personally.

CHATHAM, N. Y.—A telephone connected with the local exchange is to be placed in the new electric pumping plant at Lake Chatham.

New Incorporations.

DES MOINES, IOWA—The Manning Signal Light Company has been incorporated. Incorporators are Edward S. Manning, H. J. Mills, Samuel Compton, C. A. Bishop, W. D. Sheehan. The capital stock is $100,000, and the principal place of business is this city.

NEW YORK, N. Y.—The Manhattan Institute of Electro-Therapeutics has been incorporated to treat by electricity all acute and chronic diseases; capital, $25,000; directors, Henry Goldberg, of 122 East 105th street, and R. H. Goldberg, of this city, and T. M. Buckley, of Brooklyn.

GRAND RAPIDS, MICH.—The Adams-Bagnall Electric Company has been incorporated, with a capital stock of $225,000.

EAST HADDAM, CT.—East Haddam Electric Light Company has been incorporated, with a capital stock of $10,000.

KANSAS CITY, MO.—The Central Electric Railway Company has been incorporated by Samuel M. Jarvis, W. C. Scarritt, R. R. Conklin, F. S. Groves, William M. Reid and others; capital stock, $1,000,000.

Business Troubles

BRIDGTON, ME.—Bridgton & Harrison Electric Company gave chattel and real estate mortgage for $8,000.

KANSAS CITY, MO.—J. W. Mason, electrical supplies, reported to have been sued for $70.

EAST ORANGE, N. J.—Crocker-Wheeler Electric Company gave real estate and chattel mortgage for $200,000.

DOLGEVILLE, N. Y. — Dolgeville Electric Light and Power Company appointed temporary receiver.

Increase of Capital.

HARTFORD, CT.—The Bryant Electric Company has increased its capital stock from $75,000 to $100,000.

DETROIT, MICH.—Detroit Switchboard and Telephone Construction Company has increased its capital stock from $100,000 to $250,000.

NEW YORK, N. Y.—The New England Telegraph and Telephone Company held meeting of stockholders recently, and agreed to increase capital stock from $12,000,000 to $15,000,000.

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED JULY 12, 1898.

607,018 Underground electric conduit; T. Connelly, Chicago, Ill. - A conduit, composed of a series of tubes laid coaxially, said tubes being chamfered on their ends, and an unbroken, corrugated, metallic ring over the joints for holding the said tubes in line.

607,036 Electric controlling apparatus for switch valves; E. G. Harris, Rolla, Mo.

607,065 Trolley for third rails; L. M. Maxham, Boston, Mass. — Consists of a plane surfaced third rail, a trolley-wheel running thereon, bearings for said wheel adapted to resistingly permit a slight canting of the same, and means whereby such canting automatically guides said wheel toward the center line of the third rail.

607,070 Electric cable for driving conveyances; A. Norman, Toronto, Canada—An electric cable, consisting of continuous positive and negative conductors, insulating material between and surrounding the said conductors, and a switch for each conductor attached to and surrounding the cable.

607,078 Electrode plate for electric accumulators; P. F. Ribbe, Berlin, Germany—Comprises a lead plate having openings, the celluloid bars on each side of said plate and connected together through the openings thereof, said bars having undercut edges and the active material held thereby.

607,093 Electrically heated roll; F. P. Snow, Lynn, Mass — An annular core, wound with a primary conductor and contained in a rotary shell, which forms the choking portion of a secondary circuit about the same core.

607,124 Automatic cut-out for secondary batteries; W. L. Negbaur, Brookline, Mass. —An automatic electric switch, comprising a magnet core provided with a non polarized armature, a working circuit controlled by said armature, and two coils on said magnet core wound and connected to oppose each other, the said armature being operated by the differential effect of the said coils.

607,125 Method of and apparatus for generating electricity; W. L. Negbaur, Brookline, Mass.

607,176 Electric brake for induction coils; T. B. Kinraide, Boston, Mass.—A high speed brake, consisting of a vibrating hammer and an anvil, a standard supporting said anvil, and a brace rigidly secured between said standard and the frame of the brake.

607,177 Electric brake and induction apparatus; T. B. Kinraide, Boston, Mass.—Consists of an electric brake having an electro-magnet, an anvil and a vibrating hammer, and a collector to concentrate the lines of magnetic influence on said hammer.

607,185 Electric meter; W. D. Marks, Philadelphia, Pa.—Consists of an electric meter wherein is used an ampere indicator, a shaft, connections between said shaft and said ampere indicator, and a supplemental pointer carried by said shaft.

607,233 X-ray apparatus; H. Green, Hartford, Ct.

607,239 Telegraph; L. W. Hildburgh, New York, N. Y.

607,247 Electric motor; W. S. Johnson, Milwaukee, Wis.

607,250 Electric cut-out; H. A. Lewis, Norristown, Pa.—An electric cut-out provided with a circuit-breaker interposed in the line-wire, a thermostat comprising a tube fixed at one end, a wire coil in the tube, a rod held in the said tube to press the coil against the said tube to heat the latter, and intermediate mechanism for connecting the tube with the said circuit-breaker.

607,251 Fuse holder, circuit-breaker and lightning arrester; H. A. Lewis, Norristown, Pa.

607,302 Electric locomotion; H. Van Hoevenbergh, New York, N. Y.—A system of electric locomotion, comprising two line conductors, electrically propelled vehicles connecting therewith, and current collectors for the vehicles traveling upon and supported by one conductor and provided with a folding contact engaging the other conductor, said contact being adapted to be withdrawn to permit another collector to pass.

607,311 Electric current controller; E. E. Werner, Philadelphia, Pa.

607,315 Insulator; C. L. Wingard, Walla Walla, Wash.

607,343 Switchboard and alarm mechanism; J. P. Conway, New York, N. Y.

607,351 Electric railway; W. W. Doty, New York, N. Y.

607,387 Trolley for electric railways; H. Van Hoevenbergh, New York, N. Y.—A trolley provided with a plurality of wheels set at an angle to bear upon a supply conductor at their peripheries, said wheels being mounted in a frame, provided with projections lying close to their sides to prevent spreading

607,407 Alarm system; Clyde Coleman, Chicago, Ill.—An electric protective circuit, a voltage changer situated therein at the alarm station, a device responsive to said voltage changer situated at the protected structure and acting to maintain the current constant within prescribed limits.

REISSUE.

11,678 Electric signaling mechanism; L. G. Rowland, Camden, N. J.

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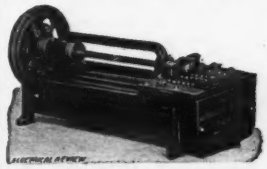
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Kindred.... ...Interests

The Western Electric Company, Chicago and New York, has recently mailed to the trade a copy of its tool catalogue No. 3. If any reader of the ELECTRICAL REVIEW failed to receive a copy, one will be sent upon application.

The Electric Ozone Syndicate, Limited, of London, has issued a pamphlet describing ozone, its production and sanitary and commercial applications, as manufactured under Mr. E. Andreoli's patents. Copies of this pamphlet may be obtained by addressing the syndicate at 5 New Union street, Moorgate street station, London, E. C., England.

Extensive Additions to Walker Company's Plant — The Walker Company, on account of rush of work and consequent need of additional space, has found it necessary to add to the large machine shops it already possesses at the Cleveland works. These machine shops alone consist of three bays, each 400 feet long, and the addition will consist of a fourth bay. Work is being rapidly pushed, and the new bay will be shortly completed and ready to receive the large machine tools which are to be placed there.

The Press Clipping Bureau, 13 Chambers street, New York city, has issued a handsome and interesting booklet describing its business as carried on by Messrs. Robert and Linn Luce. This bureau, which is the largest in existence, maintains four offices and reading-rooms, in Boston, New York, Cincinnati and Denver. It supplies many prominent men with newspaper clippings and maintains a regular news service, which is patronized by the leading class journals of the country, including the ELECTRICAL REVIEW. In 10 years the Press Clipping Bureau has grown from a very small and modest beginning to a position of valued influence and importance. The ELECTRICAL REVIEW is happy to state that the service it receives from the Press Clipping Bureau is of a most satisfactory character.

The People's Light and Power Company, of Jersey City, N. J., are erecting a new boiler-house in connection with their electric plant. The building is a modern structure in every respect. It is 60 feet wide and about 90 feet long, contains ample space for a large upright boiler, and has an arrangement for the storage of coal in the steel bunker inside the building, so that the fuel can be easily taken direct to the boilers. The tracks are arranged so that railroad cars will run into the building and discharge the coal directly into the bunker. It is of fireproof construction, with steel frame, brick side walls and iron roof covering, well lighted and ventilated. The steel work is being furnished and erected by the Berlin Iron Bridge Company, of East Berlin, Ct. Sandford & Stillman, of Jersey City, have the contract for the building.

"Graphite as a Lubricant," is the name of a pamphlet that is well worth the careful reading of any engineer. The publishers, the Joseph Dixon Crucible Company, of Jersey City, N. J., would be very glad to send a copy as well as samples of graphite to any one interested in better lubrication. There it is mentioned that an official of the Pennsylvania Railroad Company used finely pulverized graphite for lubricating a gas engine, with most marked results in the way of better lubrication—and in the saving of what would have been in his case a $75 expense. Then special mention is made of a hand oil pump. This method of lubricating engine cylinders is not new, but it has been found that a small hand oil pump is one of the most efficient devices for introducing oil or graphite just where it is wanted. Elsewhere is told what an expert engineer did with flake graphite in the way of saving power and oil.

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